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TITLE:
ULTRASONIC-WAVE
AXIAL-TENSION MEASURING
APPARATUS

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INVENTOR-INFORMATION:
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ABSTRACT:

PURPOSE: To measure the
torque of a bolt as the

function of temperature by connecting a delay material wherein the temperature coefficient of a propagating speed is known to a bolt to be measured, inputting an ultrasonic wave into the composite system, and measuring the reflected echoes.

CONSTITUTION: A delay material 2 is provided between an ultrasonic wave sensor 53 and a bolt 55 for measuring torque. With respect to the delay material 2, the ultrasonic wave propagating speed at a reference temperature and the temperature coefficient are known.

When a pulser circuit 52 drives the sensor 53 based on the command from a time measuring/operation controlling part 1, an ultrasonic wave is transmitted toward the delay material 12 and the bolt

55. The ultrasonic wave which is reflected from the interface between the delay material 12 and the bolt 55 and the edge of the bolt 55 forms echoes.

the echo A is the multiple reflection from the interface between the delay material and the bolt 55.

The echo B is the reflection from the edge of

the
bolt 55. The echoes C and
D are the reflections from
the delay material 2.
The propagation speed of
the ultrasonic wave in the
delay material and the bolt
are found based on time
intervals
Δt<SB>3</SB> and
Δt<SB>4</SB>.
The temperature is found
based on the speed in the
delay material. The
propagating speed in the
bolt, i.e. the axial torque
of the bolt, is corrected
for the temperature.

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